

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 51-70, 73, 74, and 76-78 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner (3,499,653) in view of Shapiro '024.

Gardner discloses an apparatus having a first portion 13 with a frusto-conical surface 14, a biasing device 20, a second portion 10 with a flat surface and an additional seal 14'. Gardner discloses that the faces are biased into contact when the apparatus is at rest. The angled surface 14 allows fluid to enter between the face with the helps of grooves 22 which create a desired film between the faces (see col. 3, lines 18-30 and col. 5, lines 13-25, 31-36). The portions can also include a coating. The angled face 14 and the grooves can be applied to either ring (col. 5, lines 36-42). Gardner does not disclose pads or that the flat face creates the converging or diverging gaps required by the claims. Shapiro teaches an apparatus with two portions 12 and 20 biased into contact and then separated by a fluid film during operation. Shapiro uses pads 60 that have a flat surface and are biased by devices 48 around a pivot point 80 to create converging/diverging gaps (see Fig. 5). Like Gardner's grooves, the pads create a desired film between the faces. Shapiro also teaches that the pads allow bi-directional operation (as opposed to Gardner's single direction) and provide low friction and other advantages (col. 3, lines 35-52). it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the

Art Unit: 3676

apparatus of Gardner by using the pads taught by Shapiro instead of the grooves to create a bi-directional seal that withstands distortion and maintains an effective seal across the seal faces. And, the use of a known method to improve a similar device yields expected results.

Regarding claim 66, the examiner takes Official Notice that a wave spring is a known biasing device. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus by using a wave spring in place of the spring 20.

Regarding claims 59, 73, and 74, Gardner teaches a coating but does not state it is abradable or ceramic. However, the selection of a known material based on its suitability for its intended use is considered obvious. See *In re Leshin*, 125 USPQ 416 (CCPA 1960). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use an abradable coating to provide lubrication in certain environments.

Regarding claim 76, Gardner does not appear to disclose the claimed angle range. It is not considered inventive to discover the optimum or workable ranges by routine experimentation absent some showing of criticality. See *In re Aller*, 105 USPQ 233, 235 (CCPA 1955).

Allowable Subject Matter

3. Claims 71 and 72 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

4. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

The arguments in the after final amendment of 7-24-09 were sufficient to overcome the 112 rejections. The rejections using Kimura and Singleton have been withdrawn for now and replaced with the rejection set forth above. Both Gardner and Shapiro teach mechanical seals that use a device to create a hydrodynamic lift between the sealing faces to maintain a fluid film for sealing between the face. Gardner uses grooves, which only work in one direction of rotation. Shapiro uses pivotable pads which work in either direction. Modifying Gardner with Shapiro would result in one ring with a frusto-conical surface and another flat ring with the flat pads. The pads would be located at the same location where the grooves were and would oppose the angled surface (Shapiro even teaches that the pads are located outside the contacting portion of the sealing face see col. 3, lines 4-10). The pads would oppose the angled surface and result in the claimed converging/diverging gaps in a similar manner to Applicants'. The examiner also submits that the pivot would also be spherical in a manner similar to Applicants'. Not only is there the motivation of the improving the apparatus with the benefits taught by Shapiro, but there is the rationale that the use of a known method to improve a similar apparatus would yield expected results. The examiner notes that Applicant has not argued the official notice taken for claim 66. Therefore, the examiner considers Applicant to have conceded that a wave spring is a known biasing device.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alison K. Pickard whose telephone number is 571-272-7062. The examiner can normally be reached on M-F (9-5).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer Gay can be reached on 571-272-7029. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 3676

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/Alison K. Pickard/
Primary Examiner, Art Unit 3676

AP